# DIVISION 4

## SECTION 3104F – SEISMIC ANALYSIS AND STRUCTURAL PERFORMANCE

### 3104F.1 General

***3104F.1.1 Purpose.*** *The purpose of this Section is to establish minimum standards for seismic analysis and structural performance. Seismic performance is evaluated at two criteria levels. Level 1 requirements define a performance criterion to ensure MOT functionality. Level 2 requirements safeguard against major structural damage or collapse.*

***3104F.1.2 Applicability.*** *Section 3104F applies to all new and existing MOTs structures. Structures supporting loading arms, pipelines, oil transfer and storage equipment, critical non-structural systems and vessel mooring structures, such as mooring and breasting dolphins are included. Catwalks and similar components that are not part of the lateral load carrying system and do not support oil transfer equipment may be excluded.*

***3104F.1.3 Oil Spill Risk Classification.*** *Each existing MOT shall be catagorized into one of three risk classifications (high, moderate or low) as shown in Table 31F-4-1, based on the following:*

1. *Exposed total volume of oil during transfer (“total volume” as calculated in subsection 3108F.2.3)*
2. *Number of oil transfer operations per berthing system per year*
3. *Maximum vessel size (DWT) that may call at the berthing system*

*If risk reduction strategies (see subsection 3101F.5) are adopted such that the maximum volume of exposed oil during transfer is less than 1,200 barrels, the classification level of the facility may be lowered. All new MOTs are classified as high risk.*

***3104F.1.4 Configuration Classification.*** *Each onshore MOT shall be designated as regular or irregular, in accordance with Figure 31F-4-1.*

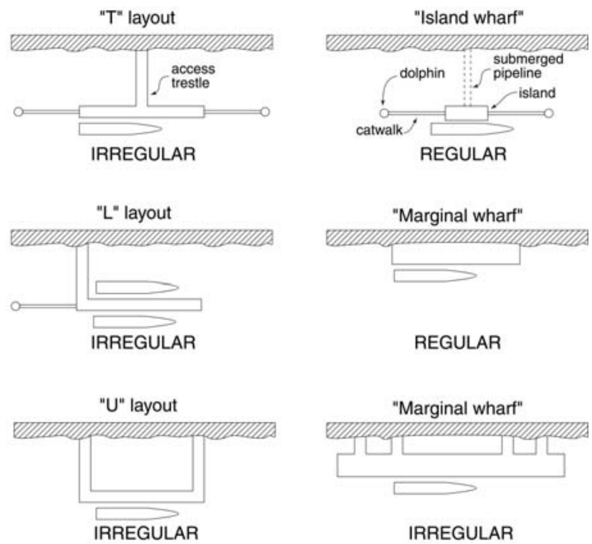


***Figure 31F-4-1: Pier and Wharf Configurations***

*Irregular configurations, such as the “T” layout, may be analyzed as regular if the presence of expansion joints divides the T-configuration into two or more regular segments. Expansion joints in this context are defined as joints that separate each structural segment in such a manner that each segment will move independently during an earthquake.*

***TABLE 31F-4-1***

***MOT RISK CLASSIFICATION***

| *Risk Classification* | *Exposed Oil (bbls)* | *Transfers per Year per Berthing System* | *Maximum Vessel Size (DWTx1000)* |
|---|---|---|---|
| *High* | $\geq 1200$ | *N.A.* | *N.A.* |
| *Moderate* | $<1200$ | $\geq 90$ | $\geq 30$ |
| *Low* | $<1200$ | $<90$ | $<30$ |

*If an irregular MOT is divided into seismically isolated sections, an evaluation of the relative movement of pipelines and supports shall be considered, including phase differences (subsection 3109F.3).*

### *3104F.2 EXISTING MOTs*

***3104F.2.1 Design Earthquake Motions.*** *Two levels of design seismic performance shall be considered. These levels are defined as follows:*

***Level 1 Seismic Performance:***

- *Minor or no structural damage*
- *Temporary or no interruption in operations*

***Level 2 Seismic Performance:***

- *Controlled inelastic structural behavior with repairable damage*
- *Prevention of structural collapse*
- *Temporary loss of operations, restorable within months*
- *Prevention of major spill (≥ 1200 bbls)*

***3104F.2.2 Basis for Evaluation.*** *Component capacities shall be based on existing conditions, calculated as "best estimates," taking into account the mean material strengths, strain hardening and degradation over time. The capacity of components with little or no ductility, which may lead to brittle failure scenarios, shall be calculated based on lower bound material strengths. Methods to establish component strength and deformation capacities for typical structural materials and components are provided in Section 3107F. Geotechnical considerations are discussed in Section 3106F.*

***3104F.2.3 Analytical Procedures.*** *The objective of the seismic analysis is to verify that the displacement capacity of the structure is greater than the displacement demand, for each performance level defined in Table 31F-4-2. The required analytical procedures are summarized in Table 31F-4-3.*

*The displacement capacity of the structure shall be calculated using the nonlinear static (pushover) procedure. It is also acceptable to use a nonlinear dynamic procedure for capacity evaluation. Methods used to calculate the displacement demand are linear modal, nonlinear static and nonlinear dynamic.*

*Any rational method, subject to the Division's approval, can be used in lieu of the required analytical procedures shown in Table 31F-4-3.*

***3104F.2.3.1 Nonlinear Static Capacity Procedure (Pushover).*** *Two-dimensional nonlinear static (pushover) analyses shall be performed; three-dimensional analyses are optional. A model that incorporates the nonlinear load deformation characteristics of all components for the lateral force-resisting system shall be displaced to a target displacement to determine the internal deformations and forces. The target displacement depends on the seismic performance level under consideration and the details are as follows:*

***3104F.2.3.1.1 Modeling.*** *A series of nonlinear pushover analyses may be required depending on the complexity of the MOT structure. At a minimum, pushover analysis of a two-dimensional model shall be conducted in both the longitudinal and transverse directions. The piles shall be represented by nonlinear elements that capture the moment-curvature/rotation relationships for components with expected inelastic behavior in accordance with Section 3107F. A nonlinear element is not required to represent each pile location. Piles with similar lateral force-deflection behavior may be lumped in fewer larger springs provided that the overall torsional effects are captured.*

*Linear material component behavior is acceptable where nonlinear response will not occur. All components shall be based on effective moment of inertia calculated in accordance with Section 3107F. Specific requirements for timber pile structures are discussed in the next subsection.*

***3104F.2.3.1.2 Timber Pile Supported Structures.*** *For all timber pile supported structures, linear elastic procedures may be used. Alternatively, the nonlinear static procedure may be used to estimate the target displacement demand,* $\Delta_d$.

*A simplified single pile model for a typical timber pile supported structure is shown in Figure 31F-4-2. The pile-deck connections may be assumed to be "pinned". The lateral bracing can often be ignored if it is in poor condition. These assumptions shall be used for the analysis, unless a detailed condition assessment and lateral analysis indicate that the existing bracing and connections may provide reliable lateral resistance.*

| Risk Classification | Seismic Performance Level | Probability of Exceedance | Return Period |
|---|---|---|---|
| High | Level 1 | 50% in 50 years | 72 years |
| | Level 2 | 10% in 50 years | 475 years |
| Moderate | Level 1 | 65% in 50 years | 48 years |
| | Level 2 | 15% in 50 years | 308 years |
| Low | Level 1 | 75% in 50 years | 36 years |
| | Level 2 | 20% in 50 years | 224 years |

| TABLE 31F-4-3 MINIMUM REQUIRED ANALYTICAL PROCEDURES | | | | |
|---|---|---|---|---|
| **Risk Classification** | **Configuration** | **Substructure Material** | **Displacement Demand Procedure** | **Displacement Capacity Procedure** |
| High/Moderate | Irregular | Concrete/Steel | Linear Modal | Nonlinear Static |
| High/Moderate | Regular | Concrete/Steel | Nonlinear Static | Nonlinear Static |
| Low | Regular/Irregular | Concrete/Steel | Nonlinear Static | Nonlinear Static |
| High/Moderate/Low | Regular/Irregular | Timber | Nonlinear Static | Nonlinear Static |

*A series of single pile analyses may be sufficient to establish the nonlinear springs required for the pushover analysis.*

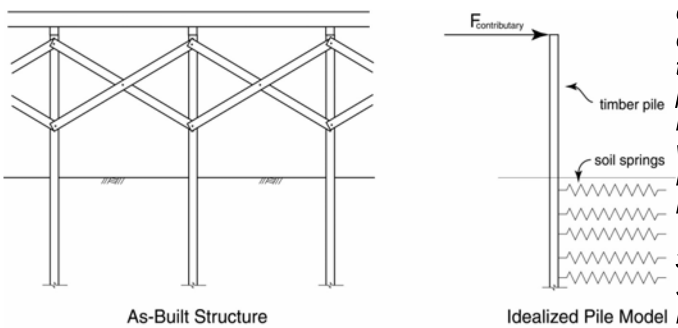


***Figure 31F-4-2: Simplified Single Pile Model of a Timber Pile Supported Structure***

***3104F.2.3.1.3 Soil-Structure Interaction (SSI).*** *Load-deformation characteristics for foundations shall be modeled as per subsection 3106F.5. Selection of soil springs shall be based on the following:*

1. *Effect of the large difference in up and down slope stiffnesses for wharf type structures*

2. *Effect of upper and lower bound soil parameters, especially for t-z curves used to model batter pile behavior*

*A separate analysis that captures the demand (subsection 3104F.2.3.2) on the piles due to permanent ground deformations, at embankments only, shall be performed.*

*If a simplified methodology is followed, the piles need to be checked for the following load combinations:*

$1.0E_{inertial}$

$1.0H_d + 0.25E_{inertial}$

*where:*

$E_{inertial}$ = *Inertial seismic load*
$H_d$ = *Foundation deformation load*

***3104F.2.3.2 Nonlinear Static Demand Procedure.*** *A nonlinear static procedure shall be used to determine the displacement demand for all concrete and steel structures, with the exception of irregular configurations with high or moderate seismic risk classifications. The following subsections describe the procedure of reference [4.1]; an alternate procedure is presented in ATC 40 [4.2]. A linear modal procedure is required for irregular structures with high or moderate seismic risk classifications, and may be used for all other classifications in lieu of the nonlinear static procedure.*

***3104F.2.3.2.1 Lateral Stiffness.*** *The lateral stiffness, k, is calculated from the force-displacement relation as the total base shear, $V_y$, corresponding to the yield displacement of the structure $\Delta_y$. $\Delta_y$ is the displacement at first yield in the pile/deck connection reinforcement.*

***3104F.2.3.2.2 Structural Period.*** *The fundamental period, T, of the structure in the direction under consideration shall be calculated as follows:*

$$T = 2\pi\sqrt{\frac{m}{k}} \qquad (4\text{-}1)$$

*where:*
*m = mass of structure in kips/g*
*k = stiffness in direction under consideration in kips/ft.*
*g = gravity, 32 ft/sec$^2$ (9.8 meters/sec$^2$)*

***3104F.2.3.2.3 Target Displacement Demand.*** *The target displacement demand of the structure, $\Delta_d$, can be calculated by multiplying the spectral response acceleration, $S_A$, corresponding to the period, $T$, by $T^2/4\pi^2$*

$$\Delta_d = S_A \frac{T^2}{4\pi^2} \qquad (4\text{-}2)$$

*If $T < T_o$, where $T_o$ is the period corresponding to the peak of the acceleration response spectrum, a refined analysis (see subsection 3104F.2.3.2.5) shall be used* *to calculate the displacement demand. Multidirectional excitation shall be addressed per subsection 3104F.4.2.*

***3104F.2.3.2.4 Damping.*** *The displacement demand established in subsection 3104F.2.3.2.3 is based on 5% damping. Higher damping values obtained from a refined analysis may be used to calculate the displacement demand.*

***3104F.2.3.2.5 Refined Analyses.*** *Refined displacement demand analyses may be calculated as per Chapters 4 and 5 of [4.1] and is briefly summarized below.*

1. *Determine $\Delta_d$, from subsection 3104F.2.3.2.3.*
2. *From the nonlinear pushover analysis, determine the structural yield displacement $\Delta_y$.*
3. *The ductility level, $\mu_\Delta$, is found from $\Delta_d/\Delta_y$. Use the appropriate relationship between ductility and damping, for the component undergoing inelastic deformation, to estimate the effective structural damping, $\xi_{eff}$. In lieu of more detailed analysis, the relationship shown in Figure 31F-4-3 or equation (4.3) may be used for concrete and steel piles connected to the deck through dowels embedded in the concrete.*

$$\xi_{eff} = 0.05 + \frac{1}{\pi}\left(1 - \frac{1-r}{\sqrt{\mu_\Delta}} - r\sqrt{\mu_\Delta}\right) \quad (4\text{-}3)$$

where:

$r$ = *ratio of second slope over elastic slope (see Figure 31F-4-5)*

4. *From the acceleration response spectra, create elastic displacement spectra, $S_D$, using equation (4.4) for various levels of damping.*

$$S_D = \frac{T^2}{4\pi^2} S_A \quad (4\text{-}4)$$

5. *Using the curve applicable to the effective structural damping, ξ, find the effective period, $T_d$ (see Figure 31F-4-4).*

6. *In order to convert from a design displacement response spectra to another spectra for a different damping level, the adjustment factors in subsection 3103F.4.2.9 shall be used.*

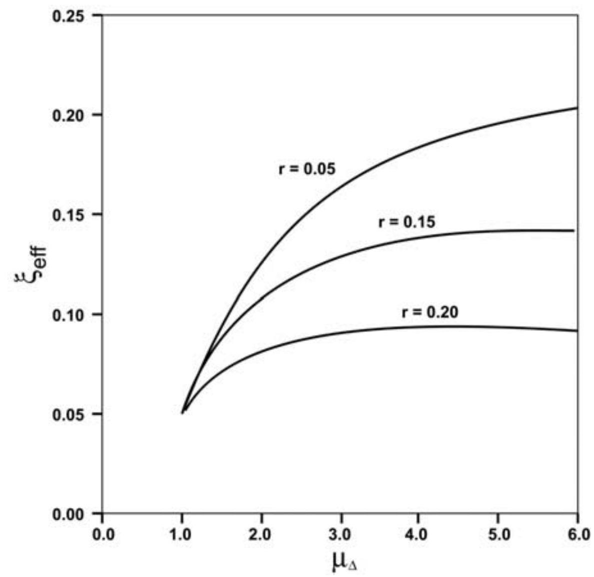


***Figure 31F-4-3: Relation Between Ductility, $\mu_\Delta$, and Effective Damping, $\xi_{eff}$ [4.1]***

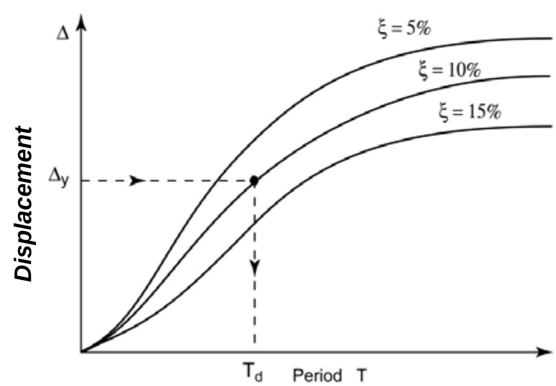


***Figure 31F-4-4 Design Displacement Response Spectra***

7. *The effective stiffness $k_e$, can then be found from:*

$$k_e = \frac{4\pi^2}{T_d^2} M \quad (4\text{-}5)$$

*where:*

*M* = *mass of deck considered in the analysis.*

$T_d$ = *effective structural period*

8. The required strength $F_u$, can now be estimated by:

$$F_u = k_e \Delta_d \qquad (4\text{-}6)$$

9. $F_u$ and $\Delta_d$ can be plotted on the force-displacement curve established by the pushover analysis. Since this is an iterative process, the intersection of $F_u$ and $\Delta_d$ most likely will not fall on the force-displacement curve and a second iteration will be required. An adjusted value of $\Delta_d$, taken as the intersection between the force-displacement curve and a line between the origin and $F_u$ and $\Delta_d$, can be used to find $\mu_\Delta$.

10. Repeat the process until a satisfactory solution is obtained (see Figure 31F-4-5).

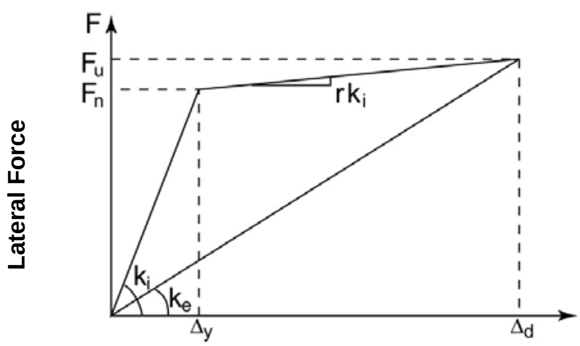


***Figure 31F-4-5: Effective Stiffness, $k_e$ [4.1]***

***3104F.2.3.3 Linear Modal Demand Procedure.*** *For irregular concrete/steel structures with moderate or high risk classifications, a linear analysis is required to predict the global displacement demands. A 3-D linear elastic response analysis shall be used, with effective moment of inertia applied to components to establish lateral displacement demands.*

*Sufficient modes shall be included in the analysis such that 90% of the participating mass is captured in each of the principal horizontal directions for the structure. For modal combinations, the Complete Quadratic Combination rule shall be used. Multidirectional excitation shall be accounted for in accordance with subsection 3104F.4.2.*

*The lateral stiffness of the linear elastic response model shall be based on the initial stiffness of the nonlinear pushover curve as shown in Figure 31F-4-6 (also see subsection 3106F.5.1). The p-y springs shall be adjusted based on the secant method approach. Most of the p-y springs will typically be based on their initial stiffness; no iteration is required.*

*If the fundamental period in the direction under consideration is less than $T_o$, as defined in subsection 3104F.2.3.2.3, then the displacement demand shall be amplified as specified in subsection 3104F.2.3.2 .5.*

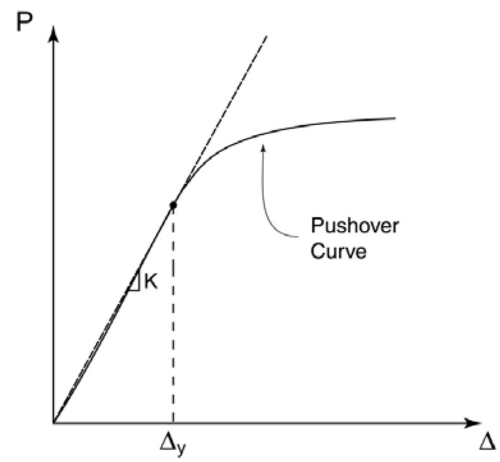


***Figure 31F-4-6: Stiffness for Linear Modal Analysis***

***3104F.2.3.4 Nonlinear Dynamic Analysis.*** *Nonlinear dynamic time history analysis is optional, and if performed, a peer review is required (see subsection 3101F.6.1). Multiple acceleration records shall be used, as explained in subsection 3103F.4.2.10. The following assumptions may be made:*

1. *Equivalent "super piles" can represent groups of piles.*
2. *If the deck has sufficient rigidity (both in-plane and out-of-plane) to justify its approximation as a rigid element, a 2-D plan simulation may be adequate.*

*A time-history analysis should always be compared with a simplified approach to ensure that results are reasonable. Displacements calculated from the nonlinear time history analyses may be used directly in design, but shall not be less than 80% of the values obtained from subsection 3104F.2.3.2.*

***3104F.2.3.5 Alternative Procedures.*** *Alternative lateral-force procedures using rational analyses based on well-established principles of mechanics may be used in lieu of those prescribed in these provisions. As per subsection 3101F.6.1, peer review is required.*

***3104F.3 New MOTs.*** *The analysis and design requirements described in subsection 3104F.2 shall* *also apply to new MOTs. Additional requirements are as follows:*

1. *Site specific response spectra analysis (see subsection 3103F.4.2.3).*
2. *Soil parameters based on site specific and new borings (see subsection 3106F.2.2).*

***3104F.4 General Analysis and Design Requirements.***

***3104F.4.1 Load Combinations.*** *Earthquake loads shall be used in the load combinations described in subsection 3103F.8.*

***3104F.4.2 Combination of Orthogonal Effects.*** *The design displacement demand, $\Delta_d$, shall be calculated by combining the longitudinal, $\Delta_x$, and transverse, $\Delta_y$, displacements in the horizontal plane (Figure 31F-4-7):*

$$\Delta_d = \sqrt{\Delta_x^2 + \Delta_y^2} \qquad (4\text{-}7)$$

where:

$$\Delta_x = \Delta_{xy} + 0.3\Delta_{xx} \qquad (4\text{-}8)$$

and

$$\Delta_y = 0.3\Delta_{yx} + \Delta_{yy} \qquad (4\text{-}9)$$

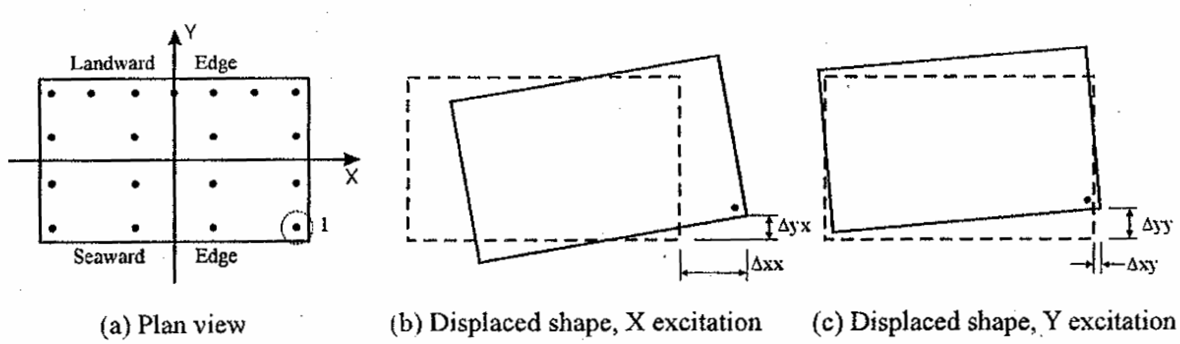


***Figure 31F-4-7 Plan View of Wharf Segment under X and Y seismic excitations [4.3]***

*or*

$$\Delta_y = \Delta_{yx} + 0.3\Delta_{yy} \qquad (4\text{-}10)$$

and

$$\Delta_x = 0.3\Delta_{xy} + \Delta_{xx} \qquad (4\text{-}11)$$

*whichever results in the greater design displacement demand.*

*In lieu of combining the displacement demands as presented above, the design displacement demand for marginal wharf type MOTs may be calculated as:*

$$\Delta_d = \Delta_y \sqrt{1 + (0.3(1 + 20e / L_l))^2} \qquad (4\text{-}12)$$

*where:*

$\Delta_y$ = *transverse displacement demand*
$e$ = *eccentricity between center of mass and center of rigidity*
$L_l$ = *longitudinal length between wharf expansion*

*This equation is only valid for wharf aspect ratios (length/breadth) greater than 3.*

***3104F.4.3 P- Δ Effects.*** *The P-Δ effect (i.e. the additional moment induced by the total vertical load multiplied by the lateral deck deflection) shall be considered unless the following relationship is satisfied (see Figure 31F-4-8):*

$$\frac{V}{W} \geq 4\frac{\Delta_d}{H} \qquad (4\text{-}13)$$

*where:*

$V$ = *base shear strength of the structure obtained from a plastic analysis*
$W$ = *dead load of the frame*
$\Delta_d$ = *displacement demand*
$H$ = *distance from the location of maximum in-ground moment to center of gravity of the deck*

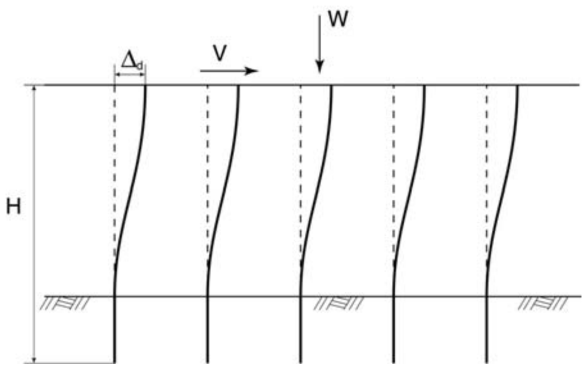


**Figure 31F-4-8: P-$\Delta$ Effect**

*For wharf structures where the lateral displacement is limited by almost fully embedded piles, P-$\Delta$ effects may be ignored; however, the individual stability of the piles shall be checked in accordance with subsection 3107F.2.5.2.*

*If the landside batter piles are allowed to fail in a Level 2 evaluation, the remaining portion of the wharf shall be checked for P-$\Delta$ effects.*

***3104F.4.4 Expansion Joints.*** *The effect of expansion joints shall be considered in the seismic analysis.*

***3104F.4.5 Shear Key Forces.*** *Shear force across shear keys connecting adjacent wharf segments, $V_{sk}$, (approximate upper bound to the shear key force [4.3]) shall be calculated as follows:*

$$V_{sk}=1.5(e/L_l)V_{\Delta T} \qquad (4\text{-}14)$$

*Where $V_{\Delta T}$ is the total segment lateral force found from a pushover analysis at the level of displacement ΔT calculated for pure translational response at the appropriate limit state. $L_l$ is the segment length and e is the eccentricity between the center of stiffness and the center of mass.*

***3104F.4.6 Connections.*** *For an existing wharf, the deteriorated conditions at the junction between the pile top and pile cap shall be considered in evaluating the moment capacity. Connection detail between the vertical pile and pile cap shall be evaluated to determine whether full or partial moment capacity can be developed under seismic action.*

*For new MOTs, the connection details shall develop the full moment capacities.*

*The modeling shall simulate the actual moment capacity (full or partial) of the joint in accordance with subsection 3107F.2.7.*

***3104F.4.7 Batter Piles.*** *Batter piles primarily respond to earthquakes by developing large axial compression or tension forces. Bending moments are generally of secondary importance. Failure in compression may be dictated by the deck-pile connection (most common type), material compression, buckling, or by excessive local shear in deck members adjacent to the batter pile. Failure in tension may be dictated by connection strength or by pile pull out. (p. 3-83 of [4.3]).*

*When the controlling failure scenario is reached and the batter pile fails, the computer model shall be adjusted to consist of only the vertical pile acting either as a full or partial moment frame based on the connection details between the pile top and pile cap. The remaining displacement capacity, involving vertical piles, before the secondary failure stage develops, shall then be established (see subsection 3107F.2.8).*

*Axial p-z curves shall be modeled. In compression, displacement capacity should consider the effect of the reduction in pile modulus of elasticity at high loads and the increase in effective length for friction piles. This procedure allows the pile to deform axially before reaching ultimate loads, thereby increasing the displacement ductility [4.3].*

*Horizontal nonlinear p-y springs are only applied to batter piles with significant embedment, such as for landside batter piles in a wharf structure. Moment fixity can be assumed for batter piles that extend well above the ground such as waterside batter piles in a wharf structure or batter piles in a pier type structure.*

***3104F.5 Nonstructural Components.*** *Nonstructural components including, but not limited to pipelines, loading arms, raised platforms, control rooms and vapor control equipment may affect the global structural response. In such cases, the seismic characteristics (mass and/or stiffness) of the nonstructural components shall be considered in the structural analysis.*

***3104F.5.1 Mass Contribution.*** *The weight of permanently attached nonstructural components shall be included in the dead load of the structure, per subsection 3103F.2. An exception is an MOT pipeline that is allowed to slide between anchor points and hence the pipeline response is typically out of phase with the structural response. Thus, the pipeline may be subjected to a different acceleration than the substructure, even if the pipeline cannot slide between anchor points. In such cases, the pipeline mass shall not be included directly in the seismic mass of the structure.*

***3104F.5.2 Seismic Loads.*** *In general, for nonstructural components, the evaluation procedures of section 3110F.8 are adequate.*

*For pipelines, the seismic analysis shall be performed in accordance with subsection 3109F.3, in lieu of subsection 3110F.8. If an analysis has been performed and support reactions are available, they may be used to determine the forces on the support structure.*

*A pipeline segment under consideration shall extend between two adjacent anchor points. A simplified pipeline analysis may be used when the relative displacement demands of anchor points are considered. As an option, a full nonlinear time-history analysis can be used to capture the nonlinear interaction between the structure and the pipeline.*

***3104F.6 Nonstructural Critical Systems Assessment.*** *A seismic assessment of the survivability and continued operation during a Level 2 earthquake (see Table 31F-4-2) shall be performed for critical systems such as fire protection, emergency shutdown and electrical power systems. The assessment shall consider the adequacy and condition of anchorage, flexibility and seismically-induced interaction. The results shall be included in the Audit.*

***3104F.7 Symbols.***

| | | |
|---|---|---|
| $e$ | = | *Eccentricity between center of mass and center of rigidity* |
| $E_{inertial}$ | = | *Inertial seismic load* |
| $F_u$ | = | *Required strength at maximum response* |
| $F_p$ | = | *Seismic design force applied horizontally at the center of gravity of pipeline segment under consideration* |
| $F_{pv}$ | = | *Seismic design force applied vertically to the center of gravity of pipeline segment under consideration* |
| $H$ | = | *Distance from maximum in-ground moment to center of gravity of the deck* |
| $H_d$ | = | *Foundation deformation load* |
| $I_p$ | = | *Importance factor equal to 1.0* |
| $K$ | = | *Stiffness in direction under consideration in k/ft* |
| $K_e$ | = | *Effective stiffness* |
| $L_l$ | = | *Longitudinal length between wharf expansion joints* |
| $m$ | = | *Mass of structure in kips/g* |
| $M$ | = | *Mass of deck considered in the analysis* |
| $r$ | = | *Ratio of second slope over elastic slope* |
| $S_A$ | = | *Spectral response acceleration, at T* |
| $S_D$ | = | *Displacement response spectrum, at T* |
| $S_{ap}$ | = | *Spectral response acceleration of pipeline segment under consideration* |
| $T$ | = | *Fundamental period of structure* |
| $T_d$ | = | *Effective structural period* |
| $V$ | = | *Base shear strength of the structure obtained from a plastic analysis* |
| $W$ | = | *Dead load of the frame* |
| $W_p$ | = | *Weight of pipeline segment under consideration* |
| $\Delta_d$ | = | *Design displacement demand* |
| $\Delta_x$ | = | *Longitudinal displacement demand* |
| $\Delta_{xx}$ | = | *X displacement under X direction excitation* |
| $\Delta_{xy}$ | = | *X displacement under Y direction excitation* |
| $\Delta_y$ | = | *Transverse displacement demand* |
| $\Delta_{yx}$ | = | *Y displacement under X direction excitation* |
| $\Delta_{yy}$ | = | *Y displacement under Y direction excitation* |
| $\mu_\Delta$ | = | *Ductility level* |
| $\xi_{eff}$ or $\xi$ | = | *Effective structural damping* |

***3104F.8 References.***

*[4.1] Priestley, M.J.N., Sieble, F., Calvi, G.M., 1996, "Seismic Design and Retrofit of Bridges," John Wiley & Sons, Inc., New York, USA.*

*[4.2] Applied Technology Council, ATC-40, 1996, "Seismic Evaluation and Retrofit of Concrete Buildings", Vol 1 and 2, Redwood City, CA.*

*[4.3] Ferritto, J., Dickenson, S., Priestley N., Werner, S., Taylor, C., Burke D., Seelig W., and Kelly, S., 1999, "Seismic Criteria for California Marine Oil Terminals," Vol.1 and Vol.2, Technical Report TR-2103-SHR, Naval Facilities Engineering Service Center, Port Hueneme, CA.*

Authority: Sections 8755 and 8757, Public Resources Code.

Reference: Sections 8750, 8751, 8755 and 8757, Public Resources Code.